

## CLAIMS

1. A plant controller using a modulation algorithm, the controller comprising:

5 means for providing a preliminary control input to be used for controlling an output of the plant to a desired value;

means for dividing the preliminary control input into a plurality of components;

means for modulating at least one of the plurality of components;

10 and

means for adding the modulated component to the other components to generate a control input.

2. The plant controller as claimed in claim 1, wherein said plurality of

15 components include:

a first component extracted by filtering the preliminary control input; and

a second component extracted from a difference between the preliminary control input and the first component, said second component being within a predetermined range of absolute values; and

wherein said means for modulating modulates the second component.

3. The plant controller as claimed in claim 1, wherein said means for

25 modulating uses an algorithm selected from a group comprising a  $\Delta\Sigma$  modulation algorithm, a  $\Sigma\Delta$  modulation algorithm and a  $\Delta$  modulation algorithm.

4. The plant controller as claimed in claim 2, wherein said filtering is

30 performed by a linear filter or a median filter.

5. The plant controller as claimed in claim 4, wherein said filtering is further performed by a  $\epsilon$  filter.
- 5 6. The plant controller as claimed in claim 2, wherein said filtering is performed by a  $\epsilon$  filter.
7. A controller for a variable lift mechanism of an internal-combustion engine, the controller using a modulation algorithm and comprising:
  - 10 means for providing a preliminary control input to be used for controlling a maximum lift amount of the variable lift mechanism to a desired lift amount;
  - means for dividing the preliminary control input into a plurality of components;
  - 15 means for modulating at least one of the plurality of components; and
  - means for adding the modulated component to the other components to generate a control input.
- 20 8. A controller for a variable phase mechanism of an internal-combustion engine, the controller using a modulation algorithm and comprising:
  - means for providing a preliminary control input to be used for controlling a cam phase of the variable phase mechanism to a desired phase;
  - 25 means for dividing the preliminary control input into a plurality of components;
  - means for modulating at least one of the plurality of components; and
  - means for adding the modulated component to the other components
- 30 to generate a control input.

9. An air/fuel ratio controller of an internal-combustion engine, the controller using a modulation algorithm and comprising:

means for providing a preliminary control input to be used for  
5 controlling an output of an exhaust gas sensor on a desired value;

means for dividing the preliminary control input into a plurality of components;

means for modulating at least one of the plurality of components;  
and

10 means for adding the modulated component to the other components to generate a control input.

10. A controller for an automatic transmission mechanism of an internal-combustion engine, the controller using a modulation algorithm and comprising:

means for providing a preliminary control input to be used for controlling an output position of the automatic transmission mechanism on a desired position;

means for dividing the preliminary control input into a plurality of  
20 components;

means for modulating at least one of the plurality of components;  
and

means for adding the modulated component to the other components to generate a control input.

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11. A method for controlling a plant, comprising:

providing a preliminary control input to be used for controlling an output of the plant to a desired value;

dividing the preliminary control input into a plurality of  
30 components;

modulating at least one of the plurality of components; and  
adding the modulated component to the other components to  
generate a control input.

- 5    12. The method of claim 11, wherein said plant is an internal combustion engine.